

Usability of Responsible Gambling Information on Gambling Operator' Websites: A Webcam-Based Eye Tracking Study

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ABSTRACT

Recent research underscored the resurgence of webcam-based eye tracking as a cost-effective, ecologically valid, and scalable choice, attributed to advancements in machine learning-assisted calibration methods. Online gambling poses a public health concern, necessitating innovative research methods and evidence-based strategies for harm reduction. This study investigates users' fixation patterns on responsible gambling (RG) information in different formats on gambling websites using webcam-based eye tracking. Participants browsed six gambling websites to search for RG information. 19 participants' data were analyzed on Areas of Interest (AOIs) categorized based on RG formats. The study has found that usability varied across RG formats and also highlights both feasibility and challenges of webcam-based eye tracking for online behavior research, with practical implications to gambling stakeholders.

CCS CONCEPTS

• **Human-centered computing** → Human computer interaction (HCI); HCI design and evaluation methods; User studies.

KEYWORDS

gambling websites, usability, webcam-based eye tracking

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1 INTRODUCTION

Research [Wisiecka et al., 2022] has demonstrated the spatial accuracy of an unmodified webcam comparable to that of a dedicated eye tracker. Online gambling participation surged to 27% by September 2022 in the UK [Gambling Commission, 2022], and gambling constitutes a public health concern [GOV.UK, 2023], necessitating effective dissemination of Responsible Gambling (RG) information on operators' websites. To facilitate customers' informed choice, transparency is essential, which relies on both quantity of available information and quality of the medium used for information accessibility [Wang et al., 2023]. Research [Dambacher et al., 2016] found that the visual format of lotteries could modulate players' attitudes to risk. Online RG information that should easily attract attention, contain relevant and meaningful content, and recommend actions or precaution to prevent harm [Lole et al., 2019]. Traditional methods like questionnaires may not accurately capture user experiences. RG information on gambling websites ranges from icons (e.g., age restriction) and specific tools (e.g., deposit limit) to educational messages (e.g., "Please play responsibly") and links (e.g., a URL directing to a support service). By investigating usability of RG content in different formats using eye tracking, we aim to inform future practice for enhancing effectiveness of RG measures. Further, our study serves as a feasibility assessment for using webcam-based eye tracking in the wild for assessing usability of online content, offering a pragmatic alternative to laboratory setups and enhancing ecological validity in real-world settings.

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2 METHODS

This study obtained ethical approval at Bournemouth University. We recruited non-gamblers (NG) and non-problem gamblers (NPG) who have bet online at least once in the last 6 months with a score lower than 8 on the Problem Gambling Severity Index (PGSI) [Ferris and Wynne, 2001]. Participants were recruited via social media advertisements and convenience sampling. After providing consent, eligible participants completed a screening survey and were then invited for the webcam eye-tracking study via links generated from the Realeye.io platform, where they were asked to browse six gambling websites (details available upon request) presented in a counterbalanced order for a maximum of 5 minutes each while searching for as much RG information as possible as quickly as possible. Participants wore minimal or no eye makeup. Following calibration, participants browsed each website with full-screen display. After each session, participants completed a follow-up survey. The process was repeated for each of the six websites. Participants received a £20 Amazon voucher as compensation. Low-quality data were cleaned after 31 participants completed the study, resulting in the sample for analysis from 19 participants (10 males; 9 females; 13 NG; 6 NPG; mean age = 32.7 years old (SD=8.3)).

3 RESULTS

Areas of Interest (AOIs) were defined on each participant's heatmap on RealEye and categorized based on RG formats as the independent variable – banners (e.g., Figure 1), icons (e.g., Figure 2), and text with and without links (e.g., Figure 3). We did not make comparisons among the six websites, as our aim was to evaluate the overall usability of RG information on gambling websites. Two separate one-way repeated measures ANOVA tests were conducted to examine the effect of RG formats on usability, specifically dwell time and Time Taken to First Fixation (TTFF). The assumption of sphericity was violated for dwell time, so Greenhouse–Geisser correction was applied. Significant differences were found in dwell time ($F(1.89, 158.35) = 25.75, p < .001, \eta^2 = 0.24$). Pairwise comparisons with Bonferroni corrections revealed that participants had significantly longer dwell time on RG banners ($m = 0.99s$) compared to icons ($m = 0.44s, p < .001$), text with links ($m = 0.35s, p < .001$), and text without links ($m = 0.39s, p < .001$). No significant effect was found for TTFF ($m = 64.67s, F(3, 252) = 0.74, p = .53$).

Non-parametric Friedman tests were also conducted due to non-normal distributions. Significant effects of information type were found for both TTFF ($\chi^2(3) = 16.74, p < .001$) and dwell time ($\chi^2(3) = 83.26, p < .001$). Wilcoxon rank tests for pairwise comparisons indicated that participants took significantly less time to find icons compared to text without links ($p = .015$). For dwell time, RG banners had significantly longer durations compared to icons ($p < .001$), text with links ($p < .001$), and text without links ($p < .001$), same as findings of the ANOVA. While non-parametric analyses yielded more significant results overall, ambiguity exists regarding appropriate p-value adjustment for Family-Wise Error Rate (FWER) control. Parametric ANOVA tests, with Bonferroni corrections, are potentially more sensitive in guarding against Type I errors and thus may yield more dependable outcomes in comparison to non-parametric alternatives though caution is warranted regarding

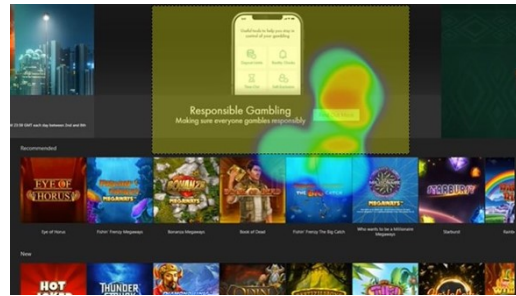


Figure 1: Heatmap showing a participant's focused attention to RG banner.



Figure 2: Heatmap showing a participant's focused attention to RG icons.

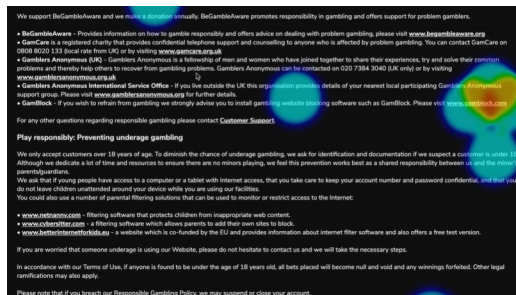


Figure 3: Heatmap showing a participant's focused attention to RG text with links (underlined) and without links.

FWER control as Bonferroni corrections may adopt a conservative stance, particularly with an extensive array of tests [Moran, 2003].

4 DISCUSSION

In summary, participants took over a minute on average to notice RG information though they were asked to do a searching task for RG information rather than browse the websites freely, indicating unsatisfactory usability. RG banners attracted significantly more attention than icons, text links, and text without links. TTFF did not differ significantly, suggesting similar efficiency in locating RG content. This might result from complexity of animated RG banners as there was little chance for participants to attend to a banner from the beginning before it was faded away. The study applied webcam-based eye tracking to assessing usability of online

RG content, offering a novel approach with broader accessibility and ecological validity. However, challenges about low data quality could result from the relatively low tracking accuracies and sampling rates, limits or configurations of participants' own devices, and less monitored procedures compared to lab settings. We encourage further exploration to consider individual differences and gambling experience, include a larger sample size, or replicate the study in a lab setting using a more controlled approach involving diverse locations and content types of RG information and across platforms, including mobile devices. Recommendations for future practice include: 1) prominently feature RG messages on homepages and streamline pathways of access; 2) integrate RG banners more effectively, ensuring clear differentiation from promotional content; 3) employ dynamic content design with multimedia elements. Overall, our study has demonstrated both feasibility and limitations of webcam-based eye tracking for research of online content and user behavior, with valuable insights for enhancing RG communication on gambling websites for preventing harm.

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of activity: universal promotion of a safer environment (primary); selective intervention for those who may be 'at risk' (secondary); and, direct support for those directly affected by gambling disorder (tertiary).

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The authors alone are responsible for the views expressed in this article, which do not necessarily represent the views, decisions or policies of the institutions with which they are affiliated.

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